F-8336 Identifier: Bernd EBERT

Actuator for a Belt Buckle

The present invention relates to an actuator that is used in a belt buckle in retention systems in motor vehicles and that indicates the proper latching of the tongue of the safety belt inserted into the buckle.

Known from DE 43 38 485 A1 is a fail-safe checking safety belt lock with microswitch, whereby the microswitch is coupled to two function parts that are independent of the latching process for the lock such that the microswitch does not assume its closed position, which is required for actuating other functional elements of the safety device, unless the two function elements of the latch are situated in the latched position simultaneously.

Furthermore, known from Eduard Hartmann GmbH is an actuator that is used in buckles. This actuator is a double-contact actuator, the contact springs or blades of which in the unloaded condition are adjacent on opposing sides to the contact points and produce the contact. One of the two blades is embodied as a double-contact blade in order to enhance actuator reliability. The actuator is embodied such that it is arranged laterally in the buckle housing such that when the belt tongue is inserted, a slide made of an insulating material slides between the contact blades. This slide remains after the belt tongue latches between the contact blades of the actuator and thus interrupts the contact. This indicates that the safety belt is prepared and properly latched in the lock.

Since the actuator has a housing that is open on top, in order to enable the slide made of an insulating material to move between the contact blades, foreign matter such as for instance liquids or solid particles can penetrate through the opening of

the buckle housing from outside. This can have a negative impact on the safety function, since contact interruption falsely signals proper latching of the belt tongue.

The contact blades curve outward in the upper area in order to make it easier to insert the slide between the contact zones. This results in a near V-shape in the upper area. Penetrating foreign matter builds up in this area and is then brought directly into the contact area by the slide.

Furthermore, automated assembly of this actuator during manufacture is not possible since the contact blades must be connected to corresponding cables before they are inserted into the actuator housing and the actuator blades are embodied such that after installation they are under a certain pre-tension. The contact blades, with the attached cables, must be inserted largely by hand into the actuator housing.

The object of the invention is therefore to embody an actuator for a buckle for safety belt systems in motor vehicles such that the contact area is largely protected from penetrating foreign matter and it is suitable for fully automated assembly during manufacture of the actuator with subsequent largely automated connection of the cable.

This object is inventively achieved in that the actuator is embodied as a double-contact actuator, whereby the contact elements are arranged in an upper closed contact space and the contact can be actuated by a slide moving in a channel arranged lateral to the interior housing space.

The actuator can be embodied as a break contact unit or a make contact unit. When the actuator is designed as a break contact unit, the contact elements penetrate on opposing sides, whereby the contact can be interrupted by the action of a slide on a contact spring. When the actuator is designed as a make contact unit, the contact elements do not penetrate, whereby in this case contact can be made by the action of a slide on a contact spring.

The contact element not actuated by the slide is embodied as a fixed contact element, whereby due to the tension force of the contact element actuated by the slide, which contact element is embodied as a contact spring, in the unactuated condition the two blades are elastically curved independent of one another. The free space required for this is provided in the interior housing space. As a result of the bending of the contact blades, contact friction occurs at the points of contact, both when breaking and making the contact. This leads to a certain self-cleaning in the contact area, which has a positive effect on the reliability of the actuator. The action of the slide on the contact spring actuates the contact. It [contact spring] is embodied in a hammer-like shape in the contact area and is designed curved such that the curved part projects into a channel arranged lateral to the interior housing space.

The hammer-shaped area of the contact spring ensures that the blades of the double-contact blade reliably make contact. The contact is actuated by the slide in that it moves when the belt tongue is inserted into the buckle. The slide strikes the curved area [of the] contact spring. As it continues to move, the curved area moves in the direction of the contact space and initiates actuation.

The invention is explained in more detail using an exemplary embodiment. The associated figure illustrates a section through the inventive actuator.

The actuator, which is designed as a break contact, comprises the actuator housing 1, which is closed by means of a cover (not shown) above the connection space 5.

The actuator has an interior housing space 2a enclosed in the contact area. A connection space 5 is provided in the lower area of the actuator. The fixed contact element 6 and the contact spring 7 terminate therein. They can be connected to the connection lines 10 here. The connection space 5 is embodied open on both sides.

The contact spring 7 has a curved area 9 and a hammer-shaped area 8. The curved area 9 penetrates the fixed contact element 6 in the area of the double contact blades and projects into the channel 3. A downward movement by the slide 4 as a result of the belt tongue being inserted into the buckle acts on the contact spring 7 and interrupts the contact.

The hammer-shaped area 8 of the contact spring 7 forms the seating surface on both sides on the blades of the fixed contact element 6 and thus the two contact points of the actuator.

The contact blades of the fixed contact element 6 in the contacted condition are under a bending stress and are therefore elastically curved. When the contact spring is actuated, they move back into the uncurved condition. Thus contact friction occurs in the contact area. This also occurs when the contact is made

when the contact spring 7 springs back into the unactuated condition when the slide 4 moves upward.

The actuator embodied in this manner can be assembled fully automatically. The fixed contact element 6 and the contact spring 7 can be inserted by means of appropriate automated equipment, specifically in a sequence in which the contact spring 7 is inserted first and then the fixed contact element 6 is inserted. After insertion, this is then pushed into its final installed position. Once the interior housing space 2 is closed by means of a cover, the functioning of the actuator can be tested. Then the connection lines 10 can be attached. This is largely automated using crimping or welding, since the housing 1 is open on both sides in the area of the connection space 5.

The contact space 2 is embodied closed from the top, so that foreign matter cannot penetrate into the contact area. Thus protection from malfunctions due to soiling is provided.

Key

1 – Actuator housing

2 – Interior housing space

2a – Upper interior housing space

3 – Channel

4 – Slide

5 – Connection space

6 – Fixed contact element

7 – Contact spring

8 – Hammer-shaped area

9 – Curved area

10 – Connection lines

11 – Frame